



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/579,228

11/07/2006

Koji Hotta

12394/2

1205

23838 7590 01/30/2009

KENYON & KENYON LLP
1500 K STREET N.W.
SUITE 700
WASHINGTON, DC 20005

EXAMINER

DOAN, THERESA T

ART UNIT

PAPER NUMBER

2814

MAIL DATE

DELIVERY MODE

01/30/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/579,228	Applicant(s) HOTTA ET AL.
	Examiner Theresa T. Doan	Art Unit 2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 May 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>111307&051206</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The previous Restriction mailed on 10/16/08 is withdrawn. However, based on the preliminary amendment filed 05/12/06, claims 1-6 are cancelled and claims 7-16 are pending in the application.

Drawings

2. Figure 7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 8-16 are objected to because of the following informalities:

In claims 8-16, line 1, the use of the article "A" to preface the preamble of the dependent claims should be changed to - - The - - .

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Uenishi et al. (5,894,149).

Regarding claim 7, Uenishi (Fig. 30) discloses a semiconductor device of IGBT (column 18, lines 35-36) comprising: a top region 5 of a second conductivity type (N+); a deep region 1 of the second conductivity type; an intermediate region 4 of a first conductivity type (P) for isolating the top region 5 and the deep region 1; a collector region 3 of the first conductivity type contacting with the deep region 1 and being isolated from the intermediate region 4 by the deep region 1; an emitter electrode 10 connected with the top region 5; a collector electrode 11 connected with the collector region 3; and a trench gate 70 facing a portion of the intermediate region 4 via an insulating layer 7, wherein the portion facing the trench gate 70 isolates the top region 5 and the deep region 1, and wherein the trench gate 70 extends along a longitudinal direction and width of the trench gate varies along the longitudinal direction.

Regarding claim 8, Uenishi (Fig. 30) discloses a plurality of trench gates 70 extending in parallel is provided, and variations of width of trench gates along the longitudinal direction are aligned in phase between adjacent trench gates.

Regarding claim 9, Uenishi (Fig. 30) discloses wherein a side wall of the trench gate at a wider width is parallel with a side wall of an adjacent trench gate.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uenishi et al. (5,894,149).

Regarding claims 10-11 and 14-15, Uenishi (Fig. 30) discloses a pair comprising a wide trench gate and a narrow trench gate is repeated along the longitudinal direction but does not disclose the total length of the wide trench gates is 30 to 80 % of the total length of the trench gate.

However, the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. *In Gardner v. TEC Systems, Inc.*, 725 F. 2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to form the total length of the wide trench gates is 30 to 80 % of the total length of the trench gate as claimed,

Art Unit: 2814

because the dimensions are not critical since they can be optimized during routine experimentation, depending upon the device in a particular application.

Regarding claim 12, Uenishi (Fig. 30) discloses a plurality of trench gates 70 extending in parallel is provided, and variations of width of trench gates along the longitudinal direction are aligned in phase between adjacent trench gates.

Regarding claims 13 and 16, Uenishi (Fig. 30) discloses width of the intermediate region 4 interposed between adjacent wide trench gates 70 is narrow such that the intermediate region 4 interposed between adjacent wide trench gates and the top region 5 is located above the intermediate region interposed between adjacent wide trench gates 70. Uenishi does not show the intermediate region interposed between adjacent wide trench gates becomes a depressed region when on-voltage is not being applied to the trench gates.

It is noted that where the claimed and prior art products are identical or substantially identical in structure or composition or are produced by identical or substantially identical processes, claimed properties or functions are presumed to be inherent. In re Best, 195 USPQ 430, 433 (CCPA 1977). Therefore, if the prior art teaches the identical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). In this case, the IGBT semiconductor device of Uenishi is the same structure as the IGBT semiconductor device of invention as claimed. Thus, the IGBT semiconductor device of

Art Unit: 2814

Uenishi would inherently have functions of the intermediate region interposed between adjacent wide trench gates becomes a depressed region when on-voltage is not being applied to the trench gates.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Theresa T. Doan whose telephone number is (571) 272-1704. The examiner can normally be reached on Monday, Tuesday and Thursday from 7:00AM - 3:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, WAEL FAHMY can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Theresa T. Doan/
Primary Examiner, Art Unit 2814